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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,383	07/24/2006	Hendricus Clemens De Ruijter	NL040080	1280

24737 7590 06/25/2009

PHILIPS INTELLECTUAL PROPERTY & STANDARDS
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EXAMINER	
ADDY, ANTHONY S	

ART UNIT	PAPER NUMBER
2617	

MAIL DATE	DELIVERY MODE
06/25/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/597,383	DE RUIJTER, HENDRICUS CLEMENS	
	Examiner	Art Unit	
	ANTHONY S. ADDY	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07/24/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

2. As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.
(1) Field of the Invention.
(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

3. The disclosure is objected to because of the following informalities: The specification does not include section headings, which appear in upper case, without underlining or bold type.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. **Claims 10-12** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows:

Claim 10, recites "processor *program product* for receiving ….," however a program product not claimed as embodied in a computer-readable media are descriptive material per se and are not statutory because they are not capable of causing functional change in a computer, hence claim 10 is directed to non-statutory subject matter.

Claim 11, recites a "Transforming module" for use in a unit for receiving a signal…, however, as per Applicant's originally filed specification on page 9, lines 10-11, the "transforming module" may be realized through software, hence claim 11 is directed to non-statutory subject matter, since a software not claimed as embodied in a computer-readable media are not statutory because they are not capable of causing functional change in a computer.

Claim 12, recites a "Processing module" for use in a unit for receiving a signal…, however, as per Applicant's originally filed specification on page 9, lines 10-11, the "processing module" may be realized through software, hence claim 12 is directed to non-statutory subject matter, since a software not claimed as embodied in a computer-readable media are not statutory because they are not capable of causing functional change in a computer.

While computer programs claimed as computer listings per se, i.e., the descriptions or expressions of the programs, are not physical "things," they are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program's functionality to be realized, hence claims 10-12 above are directed to non-statutory subject matter.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1, 3, 5, 7** and **9-12** are rejected under 35 U.S.C. 102(e) as being anticipated by **Sugar et al., U.S. Patent Number 6,965,762 (hereinafter Sugar)**.

Regarding claim 1, Sugar discloses a diversity system (*10*) for transmitting a signal comprising at least two sub-carriers (*e.g., the signal $H^T(k)$*) from a first unit (*e.g., communication device 200*) to a second unit (*e.g., communication device 100*) (see col. 4, lines 63-67, col. 9, lines 1-12, col. 11, lines 48-50 and figs. 1 & 6), which first unit comprises a transmitter (*e.g., transmitter 312*) for transmitting the signal (see col. 3,

lines 58-59, col. 4, lines 66-67, col. 9, lines 1-5 and figs. 2 & 6 [*i.e., note that Sugar teaches the communication devices 100 and 200 may have identical architectures as depicted in fig. 2*]), which second unit comprises a receiver (*e.g., RF circuitry 610*) coupled to at least two antennas (*e.g., antennas 580*) located at different positions for receiving the signal (see col. 3, lines 9-11, col. 4, lines 66-67, col. 11, lines 48-50 and figs. 6 & 9), which receiver comprises a transforming module (*e.g., an FFT 650*) for converting received antenna signals into sub-carrier-vectors per sub-carrier and per antenna (*i.e., reads on an FFT 650 converting the received RF signal detected at each antenna for each of the sub-carriers to a frequency domain signal corresponding to each sub-carrier frequency k which is multiplied by a corresponding receive antenna weight $w_{rx}(k)$ for the corresponding one of the N antennas*) (see col. 11, lines 48-60 and fig. 9) and a processing module (*e.g., an adder 670*) for processing the sub-carrier-vectors per sub-carrier (see col. 11, lines 62-63 and fig. 9).

Regarding claim 3, Sugar discloses all the limitations of claim 1. In addition Sugar teaches a diversity system, for further transmitting a return signal comprising at least two sub-carriers (*e.g., the signal H(k)*) from the second unit (*e.g., communication device 100*) to the first unit (*e.g., communication device 200*) (see col. 9, lines 1-12, col. 11, lines 36-42 and fig. 6), which first unit further comprises a receiver (*e.g., a receiver 314*) for receiving the return signal (see col. 3, lines 50-61, col. 9, lines 1-12 and figs. 2 & 6), which second unit further comprises a transmitter (*e.g., transmitter 500*) coupled to at least two antennas (*e.g., antennas 580*) located at different positions for transmitting the return signal (*i.e., the signal H(k)*) (see col. 9, lines 1-12, col. 11, lines 36-42 and

figs. 6 & 8), which transmitter comprises a reverse processing module (*e.g., a multiplier 510*) for generating sub-carrier-vectors per sub-carrier and per antenna and a reverse transforming module (*e.g., an IFFT 530*) for converting the sub-carrier-vectors into antenna signals to be transmitted (see col. 11, lines 19-40 and figs. 6 & 8).

Regarding claim 5, Sugar discloses a Unit (*e.g., communication device 100*) for receiving a signal comprising at least two sub-carriers (*e.g., the signal $H^T(k)$*) from a further unit (*e.g., communication device 200*) (see col. 4, lines 63-67, col. 9, lines 1-12, col. 11, lines 48-50 and figs. 1 & 6), which unit (i.*e., the communication device 100*) comprises a receiver (*e.g., RF circuitry 610*) coupled to at least two antennas (*e.g., antennas 580*) located at different positions for receiving the signal (see col. 3, lines 9-11, col. 4, lines 66-67, col. 11, lines 48-50 and figs. 6 & 9), which receiver comprises a transforming module (*e.g., an FFT 650*) for converting received antenna signals into sub-carrier-vectors per sub-carrier and per antenna (*i.e., reads on an FFT 650 converting the received RF signal detected at each antenna for each of the sub-carriers to a frequency domain signal corresponding to each sub-carrier frequency k which is multiplied by a corresponding receive antenna weight $w_{rx}(k)$ for the corresponding one of the N antennas*) (see col. 11, lines 48-60 and fig. 9) and a processing module (*e.g., an adder 670*) for processing the sub-carrier-vectors per sub-carrier (see col. 11, lines 62-63 and fig. 9).

Regarding claim 7, Sugar discloses all the limitations of claim 5. In addition, Sugar teaches a unit for further transmitting a return signal comprising at least two sub-carriers (*e.g., the signal H(k)*) to the other unit (*i.e.., communication device 200*) (see

col. 9, lines 1-12, col. 11, lines 36-42 and fig. 6), which unit further comprises a transmitter (*e.g., transmitter 500*) coupled to at least two antennas (*e.g., antennas 580*) located at different positions for transmitting the return signal (*i.e., the signal H(k)*) (see col. 9, lines 1-12, col. 11, lines 36-42 and figs. 6 & 8), which transmitter comprises a reverse processing module (*e.g., a multiplier 510*) for generating sub-carrier-vectors per sub-carrier and per antenna and a reverse transforming module (*e.g., an IFFT 530*) for converting the sub-carrier-vectors into antenna signals to be transmitted (see col. 11, lines 19-40 and figs. 6 & 8).

Regarding claim 9, Sugar discloses a method for receiving a signal comprising at least two sub-carriers (*e.g., the signal $H^T(k)$*) via at least two antennas (*e.g., antennas 580*) located at different positions (see col. 4, lines 63-67, col. 9, lines 1-12, col. 11, lines 48-50 and figs. 1 & 6), which method comprises a transforming step for converting received antenna signals into sub-carrier-vectors per sub-carrier and per antenna and a processing step for processing the sub-carrier-vectors per sub-carrier (*i.e., reads on an FFT 650 converting the received RF signal detected at each antenna for each of the sub-carriers to a frequency domain signal corresponding to each sub-carrier frequency k which is multiplied by a corresponding receive antenna weight $w_{rx}(k)$ for the corresponding one of the N antennas and combined by an adder 670 to recover the digital frequency domain symbol s(k)*) (see col. 11, lines 48-63 and fig. 9) (see col. 11, lines 62-63).

Regarding claim 10, Sugar discloses a processor program product for receiving a signal comprising at least two sub-carriers (*e.g., the signal $H^T(k)$*) via at least two

antennas (*e.g., antennas 580*) located at different positions (see col. 3, lines 9-11, col. 4, lines 66-67, col. 11, lines 48-50 and figs. 6 & 9), which processor program product comprises a transforming function (*i.e., the FFT 650*) for converting received antenna signals into sub-carrier-vectors per sub-carrier and per antenna (*i.e., reads on an FFT 650 converting the received RF signal detected at each antenna for each of the sub-carriers to a frequency domain signal corresponding to each sub-carrier frequency k which is multiplied by a corresponding receive antenna weight* $w_{rx}(k)$ *for the corresponding one of the N antennas*) (see col. 11, lines 48-60 and fig. 9) and a processing function (*e.g., an adder 670*) for processing the sub-carrier-vectors per sub-carrier (see col. 11, lines 62-63 and fig. 9).

Regarding claim 11, Sugar discloses a transforming module (*e.g., an FFT 650*) for use in a unit (*e.g., communication device 100*) for receiving a signal comprising at least two sub-carriers (*e.g., the signal* $H^T(k)$) from a further unit (*e.g., communication device 200*) (see col. 4, lines 63-67, col. 9, lines 1-12, col. 11, lines 48-50 and figs. 1 & 6), which unit comprises a receiver (*e.g., RF circuitry 610*) coupled to at least two antennas (*e.g., antennas 580*) located at different positions for receiving the signal (see col. 3, lines 9-11, col. 4, lines 66-67, col. 11, lines 48-50 and figs. 6 & 9), which receiver (*i.e. the receiver 600*) comprises the transforming module (*i.e., the FFT 650*) for converting received antenna signals into sub-carrier-vectors per sub-carrier and per antenna (*i.e., reads on an FFT 650 converting the received RF signal detected at each antenna for each of the sub-carriers to a frequency domain signal corresponding to each sub-carrier frequency k which is multiplied by a corresponding receive antenna*

weight $w_{rx}(k)$ for the corresponding one of the N antennas) (see col. 11, lines 48-60 and fig. 9) and a processing module (*e.g., an adder 670*) for processing the sub-carrier-vectors per sub-carrier (see col. 11, lines 62-63 and fig. 9).

Regarding claim 12, Sugar discloses a processing module (*e.g., an adder 670*) for use in a unit (*e.g., communication device 100*) for receiving a signal comprising at least two sub-carriers (*e.g., the signal $H^T(k)$*) from a further unit (*e.g., communication device 200*) (see col. 4, lines 63-67, col. 9, lines 1-12, col. 11, lines 48-50 and figs. 1 & 6), which unit comprises a receiver (*e.g., RF circuitry 610*) coupled to at least two antennas (*e.g., antennas 580*) located at different positions for receiving the signal, which receiver comprises a transforming module (*e.g., an FFT 650*) for converting received antenna signals into sub-carrier-vectors per sub-carrier and per antenna (*i.e., reads on an FFT 650 converting the received RF signal detected at each antenna for each of the sub-carriers to a frequency domain signal corresponding to each sub-carrier frequency k which is multiplied by a corresponding receive antenna weight $w_{rx}(k)$ for the corresponding one of the N antennas*) (see col. 11, lines 48-60 and fig. 9) and the processing module (*i.e., the adder 670*) for processing the sub-carrier-vectors per sub-carrier (see col. 11, lines 62-63 and fig. 9).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. **Claims 2, 4, 6** and **8** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sugar et al., U.S. Patent Number 6,965,762 (hereinafter Sugar)** as applied to **claims 1, 3, 5** and **7** above, and further in view of **Baggen et al., U.S. Patent Number 5,483,529 (hereinafter Baggen)**.

Regarding claim 2, Sugar teaches all the limitations of claim 1. Sugar further teaches a diversity system, wherein the transforming module converts, first antenna signals received via a first antenna and converts, second antenna signals received via a second antenna (*i.e., reads on the teaching of Sugar that an FFT 650 converts the time domain digital signal corresponding to each sub-carrier k detected at each antenna 580 for each of the sub-carriers*) (see col. 11, lines 48-57 and figs. 6 & 9).

Sugar fails to explicitly teach the transforming module converts the received first and second antenna signals ***during a first and second time-interval***.

In an analogous field of endeavor, Baggen teaches a receiver for receiving a transmission signal comprising N frequency multiplexed data modulated carriers, wherein the received time sequential groups of N numbers are converted in

consecutive periods of time T_b by a Fast Fourier Transformer (FFT) (see col. 3, lines 60-67).

It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to modify Sugar with the teachings of Baggen to include a system, wherein the transforming module converts the received first and second antenna signals during a first and second time-interval, in order to suppress crosstalk to a considerable extent and detect a transmitted data with a reduced error probability as taught by Baggen (see col. 7, lines 1-10 and col. 11, lines 6-12).

Regarding claim 4, Sugar teaches all the limitations of claim 3. Sugar further teaches a diversity system, wherein the reverse transforming module converts, first sub-carrier-vectors into first antenna signals to be transmitted via a first antenna and converts, second sub-carrier-vectors into second antenna signals to be transmitted via a second antenna (*i.e., reads on the teaching of Sugar that an IFFT 530 converts the frequency domain signal for each of the K sub-carriers and are upconverted to be transmitted via each antenna 580)* (see col. 11, lines 28-42 and figs. 6 & 8).

Sugar fails to explicitly teach the reverse transforming module converts the first and second antenna signals ***during a first and second time-interval***.

In an analogous field of endeavor, Baggen teaches an Inverse Fast Fourier Transformer (IFFT) transforms a group of N symbols to a time sequential group of N symbols covering ***consecutive periods of time T_b*** (see col. 3, lines 32-40 & 52-58).

It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to modify Sugar with the teachings of Baggen to include a system,

wherein the reverse transforming module converts the first and second antenna signals during a first and second time-interval, in order to suppress crosstalk to a considerable extent and detect a transmitted data with a reduced error probability as taught by Baggen (see col. 7, lines 1-10 and col. 11, lines 6-12).

Regarding claim 6, Sugar teaches all the limitations of claim 5. Sugar further teaches a unit, wherein the transforming module converts, first antenna signals received via a first antenna and converts, second antenna signals received via a second antenna (*i.e., reads on the teaching of Sugar that an FFT 650 converts the time domain digital signal corresponding to each sub-carrier k detected at each antenna 580 for each of the sub-carriers*) (see col. 11, lines 48-57 and figs. 6 & 9).

Sugar fails to explicitly teach the transforming module converts the received first and second antenna signals ***during a first and second time-interval***.

In an analogous field of endeavor, Baggen teaches a receiver for receiving a transmission signal comprising N frequency multiplexed data modulated carriers, wherein the received time sequential groups of N numbers are converted in ***consecutive periods of time T_b*** by a Fast Fourier Transformer (FFT) (see col. 3, lines 60-67).

It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to modify Sugar with the teachings of Baggen to include a unit, wherein the transforming module converts the received first and second antenna signals during a first and second time-interval, in order to suppress crosstalk to a considerable extent

and detect a transmitted data with a reduced error probability as taught by Baggen (see col. 7, lines 1-10 and col. 11, lines 6-12).

Regarding claim 8, Sugar teaches all the limitations of claim 7. Sugar further teaches a unit, wherein the reverse transforming module converts, first sub-carrier-vectors into first antenna signals to be transmitted via a first antenna and converts, second sub-carrier-vectors into second antenna signals to be transmitted via a second antenna (*i.e., reads on the teaching of Sugar that an IFFT 530 converts the frequency domain signal for each of the K sub-carriers and are upconverted to be transmitted via each antenna 580)* (see col. 11, lines 28-42 and figs. 6 & 8).

Sugar fails to explicitly teach the reverse transforming module converts the first and second antenna signals ***during a first and second time-interval***.

In an analogous field of endeavor, Baggen teaches an Inverse Fast Fourier Transformer (IFFT) transforms a group of N symbols to a time sequential group of N symbols covering ***consecutive periods of time T_b*** (see col. 3, lines 32-40 & 52-58).

It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to modify Sugar with the teachings of Baggen to include a unit, wherein the reverse transforming module converts the first and second antenna signals during a first and second time-interval, in order to suppress crosstalk to a considerable extent and detect a transmitted data with a reduced error probability as taught by Baggen (see col. 7, lines 1-10 and col. 11, lines 6-12).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ling et al., U.S. Patent Number 7,006,848 discloses method and apparatus for utilizing channel state information in a wireless communication system.

Vaidyanathan, U.S. Patent Number 7,308,287 discloses compensation techniques for group delay effects in transmit beamforming radio communication.

Alexiou et al., U.S. Patent Number 7,130,580 discloses method of compensating for correlation between multiple antennas.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY S. ADDY whose telephone number is (571)272-7795. The examiner can normally be reached on Mon-Thur 8:00am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on 571-272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anthony S Addy/
Examiner, Art Unit 2617